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Wood Products Used in the Construction of Apartment Buildings in Pennsylvania

Wood in Apartment Construction

A Pilot Study

Construction - Wood in Apts

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FOREST SERVICE

JUNE 1971

Wood Products Used in the Construction of Apartment Buildings in Pennsylvania

A PILOT STUDY

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RESEARCH PAPER WO-14

Forest Service

U.S. Department of Agriculture

June 1971

SUMMARY

In 1965, 53.8 million board feet of lumber, 19.5 million square feet (3/8-inch basis) of plywood, 2.5 million square feet (1/8-inch basis) of hardboard, 0.7 million square feet (1/2-inch basis) of insulation board, and 1.6 million square feet (3/4-inch basis) of particleboard was used in the construction of apartments in Pennsylvania. Approximately two-thirds of the lumber was used in floor and interior wall construction while two-thirds of the plywood went into floor and roof construction. Most of the hardboard and particleboard was used in millwork items while insulation board was used primarily in wall construction.

The use of wood products varied widely among different structural classes. The use of lumber averaged 3,334 board feet per housing unit and ranged from 970 board feet in the steel structural class to 4,537 board feet in the wood structural class. Plywood use averaged 1,211 square feet (3/8-inch basis) per housing unit, ranging from 624 square feet in the steel structural class to 1,379 square feet in the concrete structural class.

PREFACE

This research was undertaken as a pilot study to develop a methodology for estimating wood use in apartment construction. The results of the study are being published so that they may be available to market research organizations, State and Federal forestry agencies, and others interested in evaluating markets for wood products in apartment building construction.

The data were derived from a sample survey of new apartment buildings in Pennsylvania for which construction contracts were awarded in 1965. The universe consisted of 259 building projects as reported by F. W. Dodge Incorporated. Each of the building projects was classified into one of five structural classes on the basis of the material used for structural framing.

The sample consisted of 76 building projects and was selected from the universe by means of a procedure in which the probability of a project being selected was proportional to the contract award value of the project. The wood use data for each of the sample projects was obtained by "take-off" from the architectural plan and by consultation with the contractor and/or architect. The quantity of wood used in construction items was recorded in standard units of measure determined from direct measurement or by the use of conversion factors. Estimates of wood materials required for forming concrete and other uses of wood not specifically indicated on the building plans were obtained from the building contractor.

The standard errors of estimate were 3 percent for total lumber use and 3 percent for total plywood use. The errors of estimate for lumber by structural class vary from 2 to 19 percent and for plywood from 1 to 21 percent. The high errors in lumber and plywood use estimates were for projects classified as masonry.

All data were collected and prepared as one phase of the Forest Survey authorized by Section 9 of the McSweeney-McNary Forest Research Act of 1928, as amended. This act authorized and directed the Secretary of Agriculture to cooperate with State and other agencies "in making and keeping current a comprehensive survey of the present and prospective requirements for timber and other forest products. . ."

The authors and the Forest Service are indebted to the architects and builders who provided the basic data and to the Bureau of the Census, U.S. Department of Commerce, for providing the material required for sample selection. Special acknowledgment is given Clark Row for his assistance in planning the study and developing the computer program for data analysis and computation.

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INTRODUCTION

In 1965, more than $155 million were spent on the construction of 259 apartment projects of five or more dwelling units in Pennsylvania. This construction included 16,141 new housing units with a total floor area of 16.8 million square feet in buildings ranging from 2 to 24 stories (table 1).[1]

This report presents data from a pilot study on wood products used in the construction of these apartment buildings. The wood products covered are lumber, plywood, hardboard, insulation board, and particleboard. The volumes of each of these products used are shown by wood, steel, concrete, masonry, and unclassified structural classes. Within each of these classes, further information on use is given for building components such as roofs, floors, and walls and construction items such as trusses, subflooring, and sheathing.

CHARACTERISTICS OF APARTMENT BUILDING CONSTRUCTION

Expenditures greatest in wood framed apartments

Almost half of the $155 million for apartment construction was spent for buildings in the wood structural class,[1] and about one-fifth each for units in the concrete and masonry classes (fig. 1). The wood structural class also accounted for 48 percent of the housing units; the concrete and masonry classes together accounted for 33 percent.

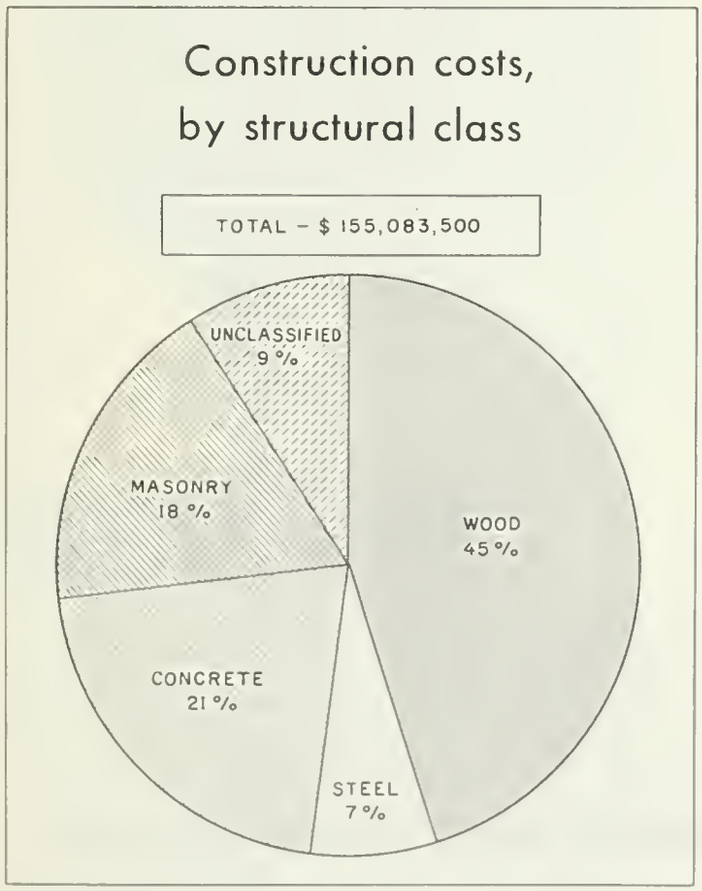

FIGURE 1

[1]The tables and definitions of the structural classes used in the study are given in the appendix.

Construction costs averaged $9.20 per square foot of floor area and $9,600 per housing unit

Construction costs per square foot of floor area averaged $9.20 and ranged from a high of $13.46 in the concrete structural class down to $6.41 in the unclassified class (fig. 2). Construction costs in the steel structural class were also fairly high, while those for the wood and the masonry structural classes were below average. Construction costs per housing unit averaged $9,600 and followed the same pattern as the costs per

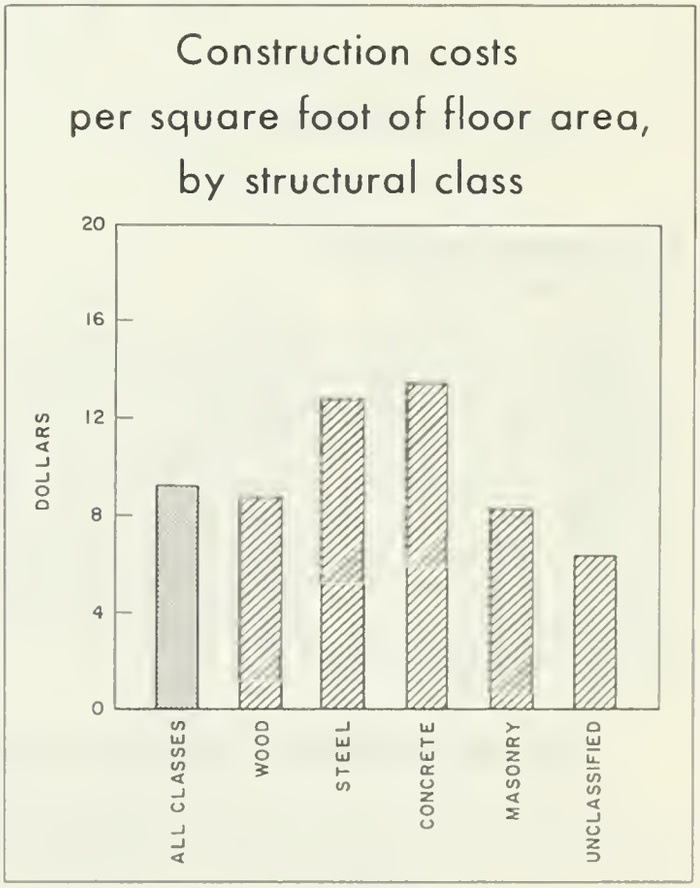

FIGURE 2

square foot (fig. 3). Concrete apartments had the highest costs, with more than $15,000 per unit. Apartments in the unclassified structural class were lowest in cost, with just under $6,700 per housing unit.

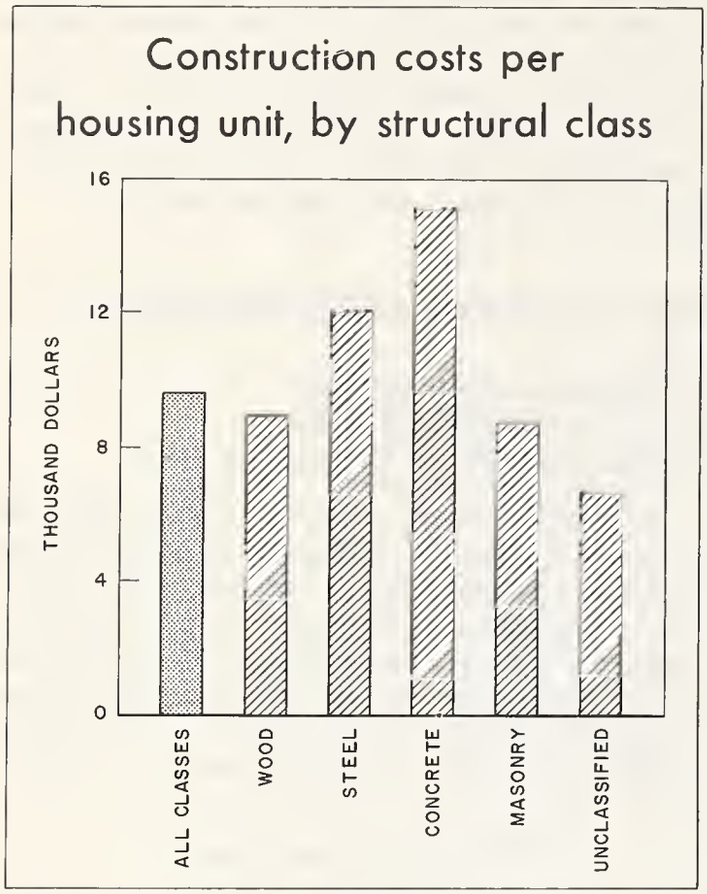

FIGURE 3

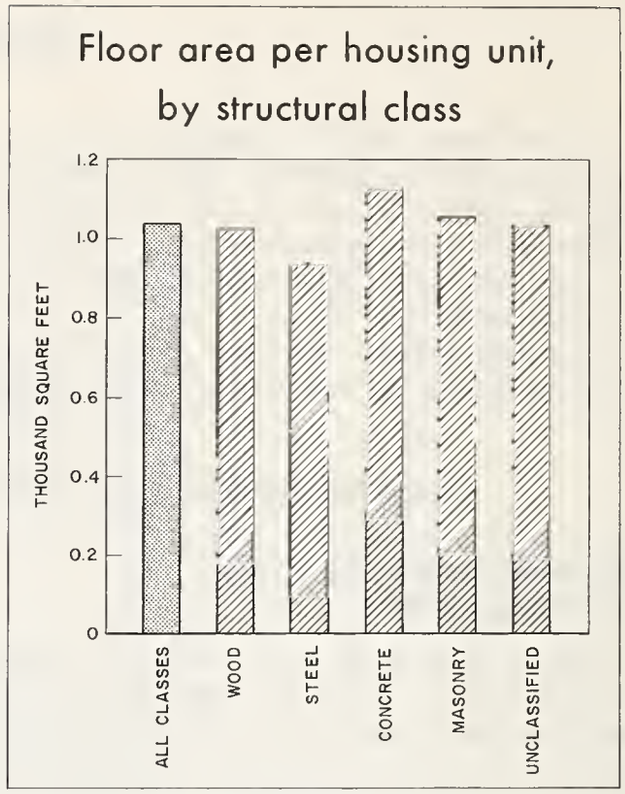

FIGURE 4

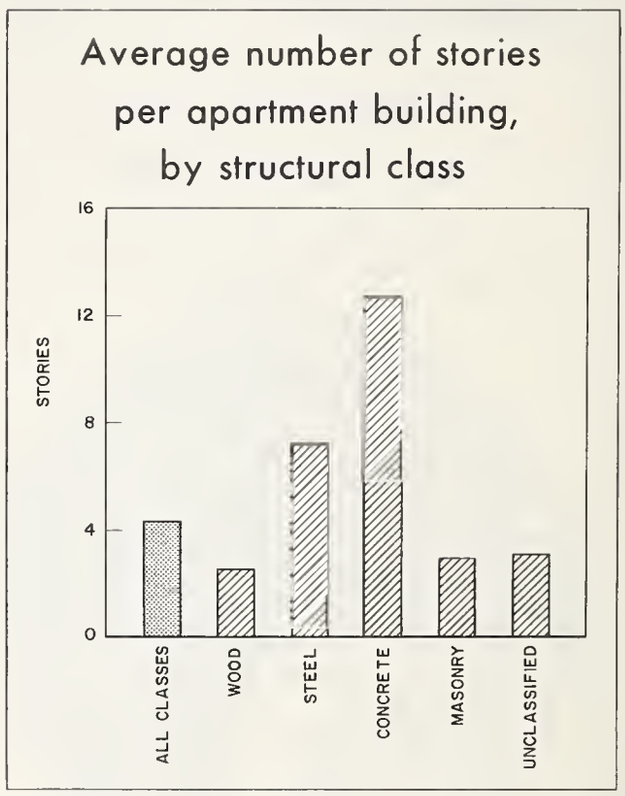

FIGURE 5

Floor area averaged 1,044 square feet per unit

The floor area per housing unit averaged 1,044 square feet (fig. 4). The smallest apartment units were in the steel structural class where average size was 942 square feet; the largest were in the concrete structural class, averaging 1,127 square feet per unit. In terms of height, apartments in the concrete structural class averaged more than 12 stories per building (fig. 5). Apartment buildings in the steel structural class averaged seven stories, and those in the other three classes ranged between two and three stories.

WOOD PRODUCTS USED IN APARTMENT BUILDING CONSTRUCTION

In 1965, 53.8 million board feet of lumber, 19.5 million square feet (3/8-inch basis) of plywood, 2.5 million square feet (1/8-inch basis) of hardboard, 1.6 million square feet (3/4-inch basis) of particleboard, and 700,000 square feet (1/2-inch basis) of insulation board were used in apartment construction in Pennsylvania.

Almost 54 million board feet used in 1965

Of the 53.8 million board feet of lumber consumed, 66 percent went into construction of buildings in the wood structural class (table 2, fig. 6). Another 13 percent was consumed by each of the masonry and the unclassified structural classes. The remaining 8 percent was used in the concrete and steel structural classes.

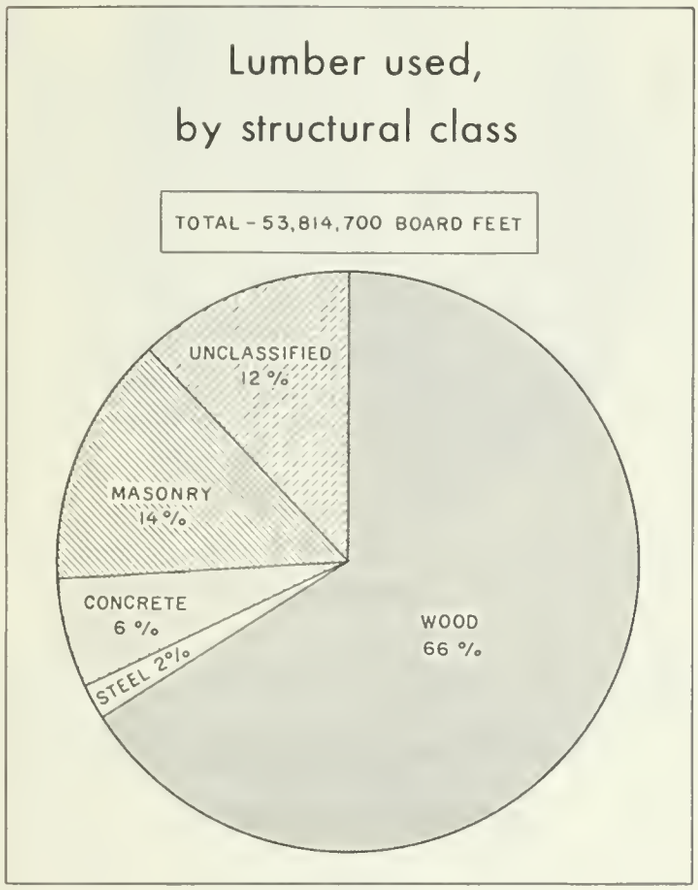

FIGURE 6

Lumber usage averaged 3.19 board feet per square foot of floor area and 3,334 board feet per unit

Lumber use per square foot of floor area averaged 3.19 board feet for all structural classes. It ranged from a high of 4.42 board feet in the wood structural class to a low of 1.30 board feet in the steel structural class (table 2). Lumber use per housing unit averaged 3,334 board feet and ranged from 970 board feet in the steel structural class to 4,537 board feet in the wood structural class (fig. 7).

There was also a wide variation in lumber use per $1,000 of construction expenditure (fig. 8). Usage in the

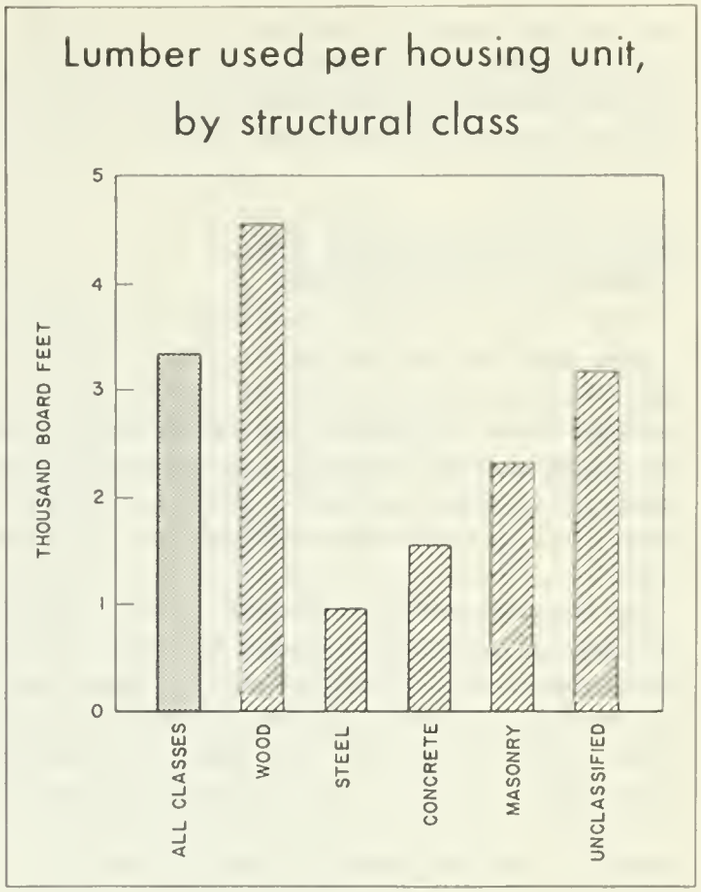

FIGURE 7

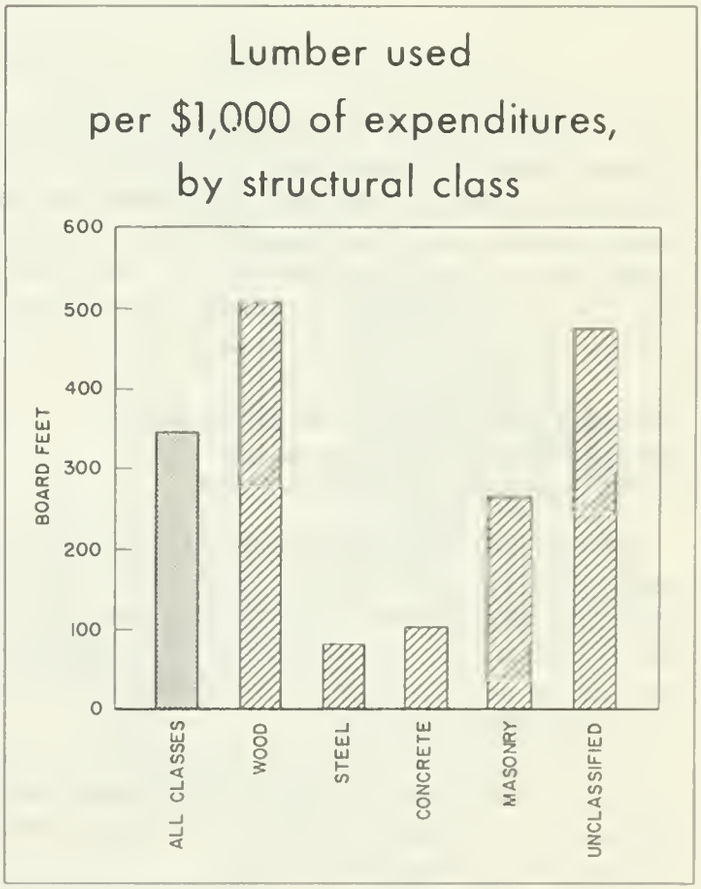

FIGURE 8

wood and the unclassified structural classes was relatively high, 508 and 473 board feet, respectively; in the steel and concrete structural classes it was low, 81 and 103 board feet. Overall lumber use averaged 347 board feet per $1,000.

Over two-thirds of lumber used in floor and wall construction

More than a third of the lumber used in apartment building went into floor construction (fig. 9), mostly as joists and finished flooring (table 4). Another third was put into interior and exterior walls, primarily as studs. The remaining third was used for roof construction items such as trusses and joists; millwork, principally interior doors and molding and shelving; and facilitating items.

The percentage of lumber used in the various building components, such as roofs, walls, and floors, in the wood, masonry, and unclassified structural classes were quite similar to the percentages for the overall average. In the concrete structural class, however, facilitating applications such as formwork accounted for 30 percent of the lumber used as compared with the average of 3 percent. In the steel structural class 42 percent of the lumber went into interior wall construction, primarily as studs.

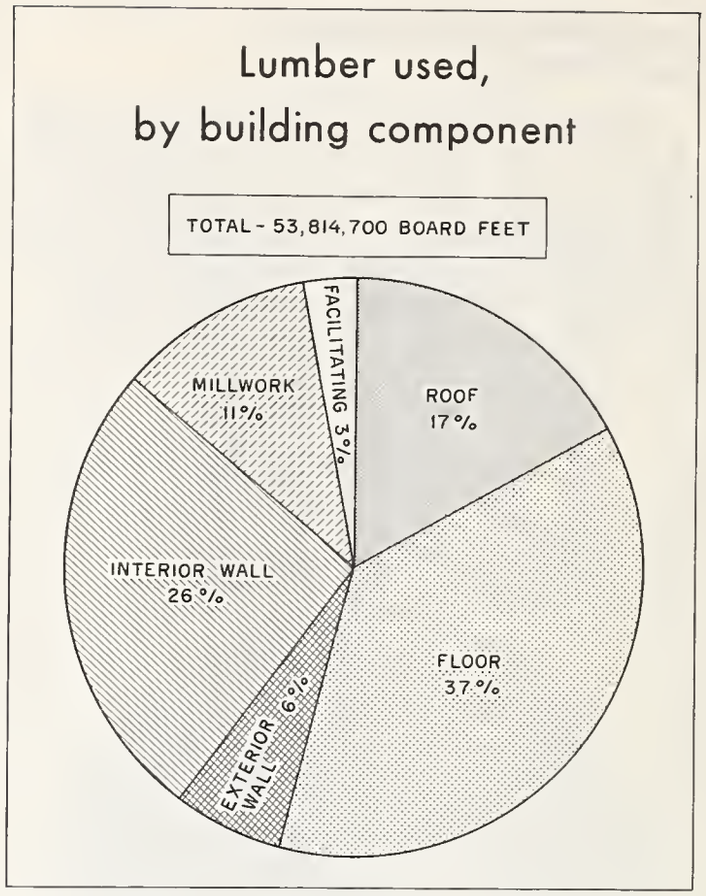

FIGURE 9

PLYWOOD

Over half (54 percent) of 19.5 million square feet (3/8-inch basis) of plywood used in Pennsylvania apartment construction in 1965 went into buildings in the wood structural class. Forty-five percent, about equally divided, was used in the concrete, masonry, and unclassified structural classes (fig. 10, table 2). Only about 3 percent went into buildings in the steel structural class.

Plywood use averaged 1.16 square feet per square foot of floor area and 1,211 square feet per housing unit

Plywood use in apartment construction averaged 1.16 square feet per square foot of floor area. Amounts somewhat above this average were used in apartments in the wood, concrete, and unclassified structural classes (table 2). In the steel and masonry structural classes, use was about half the average.

The use of plywood averaged 1,211 square feet per housing unit and ranged from a low of 624 square feet in the steel structural class to a high of 1,379 square feet in the concrete structural class (fig. 11).

Plywood use per $1,000 of construction expenditure ranged from 52 square feet in the steel structural class to

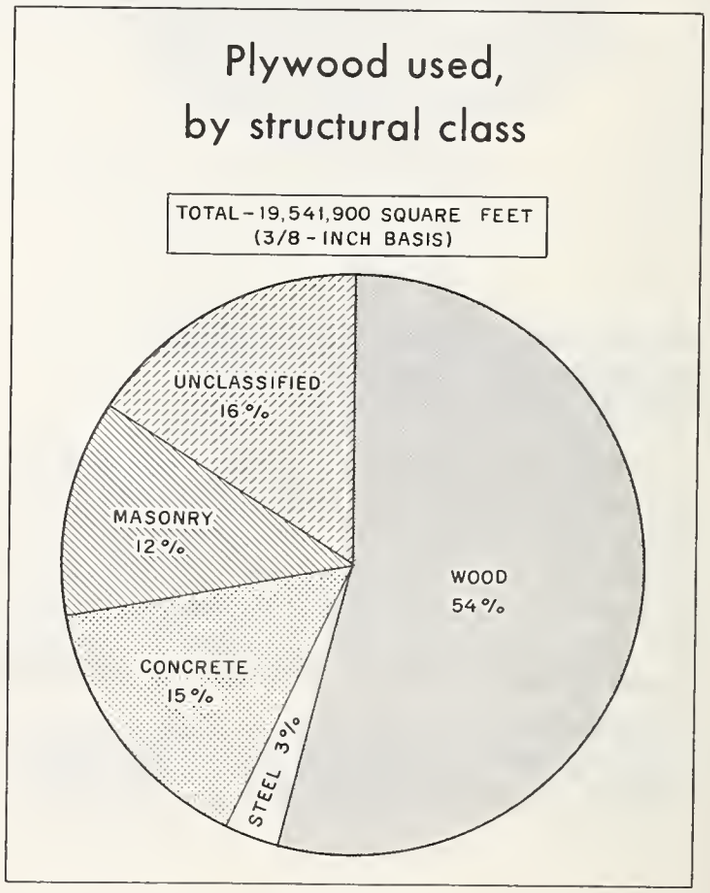

FIGURE 10

216 square feet in the unclassified structural class and averaged 126 square feet for all structural classes (fig. 12).

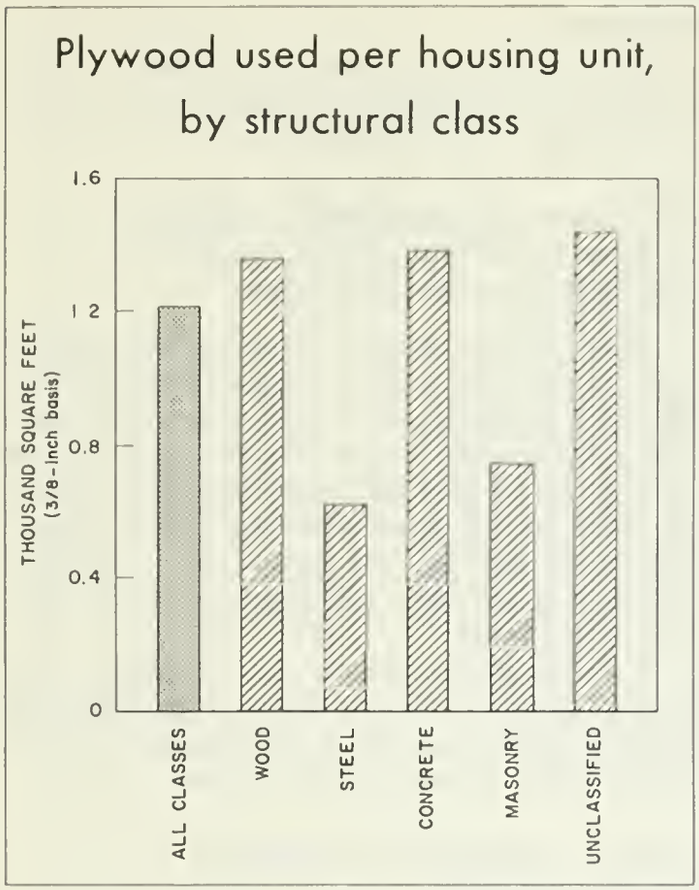

FIGURE 11

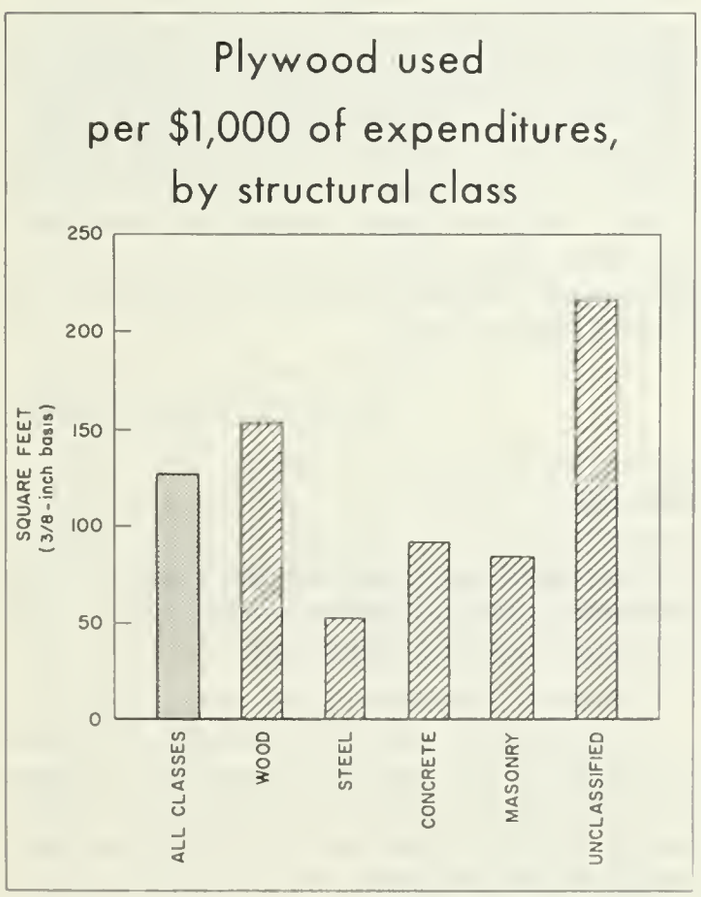

FIGURE 12

Almost two-thirds of the plywood used in roof and floor components

Sixty-four percent of the plywood used went into roof and floor construction (fig. 13). Roof construction accounted for 30 percent, almost all in roof decking. Another 34 percent was used in floor construction, 23 percent in subflooring, 11 percent in underlayment and laminated block flooring (table 5). The remaining plywood went into millwork (16 percent), wall construction (7 percent), and facilitating applications (13 percent).

In apartments in the wood structural class, 69 percent of the plywood was used as decking, subflooring, and underlayment (table 5). Roughly, the same proportion of plywood was used in these construction items in the masonry and unclassified structural classes. In the steel structural class, however, these construction items accounted for only 15 percent of the total; most of the plywood was used for flooring (29 percent) and millwork (44 percent). In the concrete structural class, 65 percent of the plywood went into formwork and 17 percent into millwork.

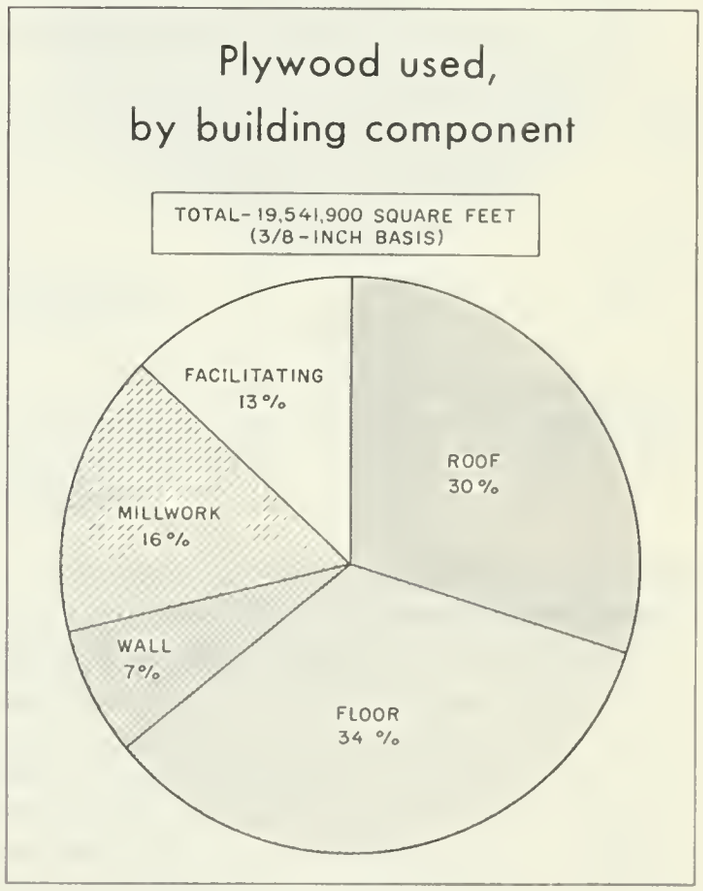

FIGURE 13

HARDBOARD

Over 2.5 million square feet used in apartment building construction

Of the 2.5 million square feet (1/8-inch basis) of hardboard used in apartment construction in Pennsylvania in 1965, 66 percent was used in buildings in the wood structural class, and 16 percent in the concrete structural class (table 3, fig. 14). About 8 percent was used in apartments in each of the masonry and the unclassified structural classes, and only minor quantities (2 percent) in the steel structural class.

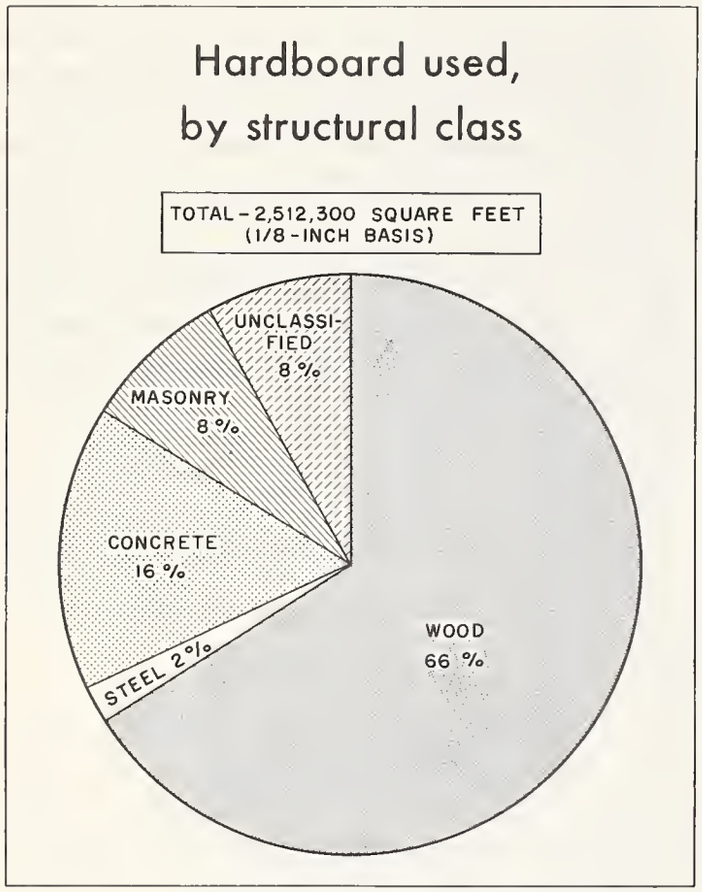

FIGURE 14

Hardboard usage averaged 0.15 square foot per square foot of floor area and 156 square feet per housing unit

Hardboard usage averaged 0.15 square foot per square foot of floor area (table 3). Usage ranged from 0.21 square foot in the wood structural class to 0.06 square foot in the steel and masonry structural classes. Use per housing unit averaged 156 square feet. Use per unit in the wood and the concrete structural classes averaged 211 square feet and 189 square feet, respectively, compared to less than 100 square feet in the other structural classes.

In terms of construction costs, hardboard usage averaged 16 square feet per $1,000 of expenditure. It ranged from 24 square feet in the wood structural class to 5 square feet in the steel structural class.

Almost two-thirds of the hardboard used in millwork

Sixty-three percent of the hardboard was used for millwork items, doors, and cabinets (table 6). The remaining 37 percent went into floor underlayment. In the wood, steel, and unclassified structural classes, hardboard use was almost equally divided between millwork and floor underlayment. In the concrete and masonry structural classes, however, the entire hardboard usage was in millwork, primarily interior doors in the concrete structural class and base cabinets in the masonry structural class.

PARTICLEBOARD

Almost 1.6 million square feet of particleboard used

Particleboard use in apartment building construction in Pennsylvania reached almost 1.6 million square feet (3/4-inch basis) in 1965. More than three-fourths of this went into apartments in the wood (52 percent) and the masonry (24 percent) structural classes (fig. 15). The concrete and the unclassified structural classes accounted for 10 and 12 percent, respectively, while only 2 percent went into the steel structural class.

Particleboard usage averaged 0.09 square foot per square foot of floor area and 97 square feet per housing unit

The use of particleboard per square foot of floor area in apartments was quite small, averaging 0.09 square foot (table 3). Use averaged 97 square feet per housing unit. Usage in the masonry structural class was above average with 117 square feet per unit; it was below average for all other classes with a low of 45 square feet in the steel structural class.

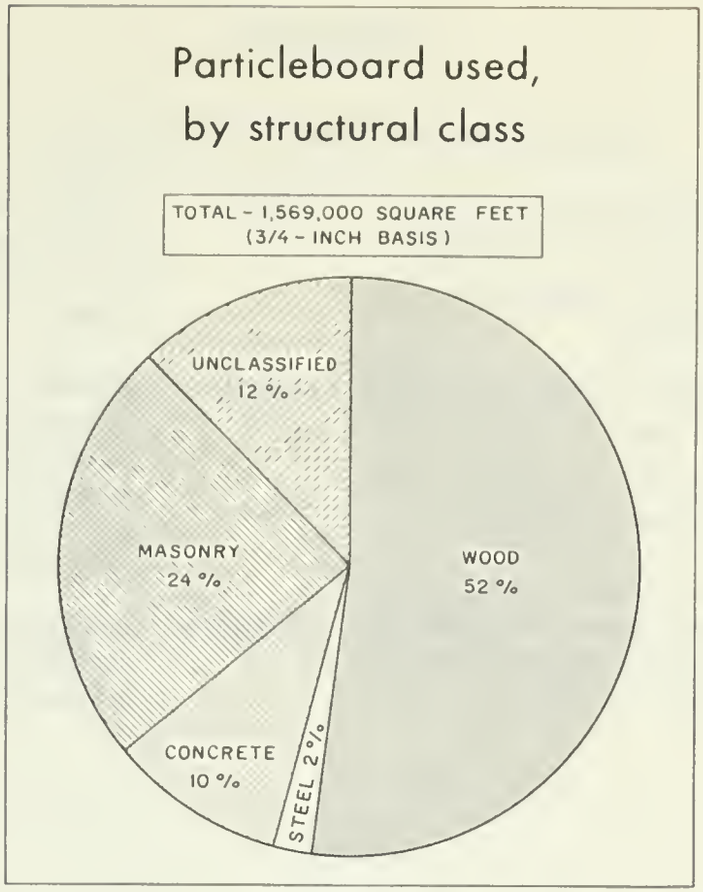

FIGURE 15

Consumption of particleboard per $1,000 of construction expenditure averaged 10 square feet, the high was slightly more than 13 square feet in the masonry structural class, the low less than 4 square feet in the steel structural class.

Most particleboard used in millwork

Eighty-five percent of the particleboard went into millwork, nearly all of it in cabinets (table 6). Floor underlayment accounted for the other 15 percent.

INSULATION BOARD

Insulation board consumption almost 700,000 square feet

Almost all (99 percent) of the 699,200 square feet (1/2-inch basis) of insulation board used in apartment construction in 1965, went into apartments in the wood structural class where usage was about 0.09 square foot per square foot of floor area, 89 square feet per housing unit, and almost 10 square feet per $1,000 of construction expenditure (table 3). The masonry structural class, the only other structural class in which particleboard was used, accounted for an average of 1 square foot per housing unit.

Ninety-eight percent of the insulation board (688,000 square feet) was used as exterior wall sheathing and 2 percent (11,200 square feet) for roof sheathing (table 6).

APPENDIX

DEFINITIONS OF STRUCTURAL CLASSES

Wood — Buildings in which wood is used in one or more of the following structural areas:

1. Wall framing consisting of wood studs or timbers.
2. Floor framing consisting of wood joists or beams.
3. Roof framing consisting of wood rafters, trusses, or beams.

Steel — Buildings who structural framing consists of steel columns, beams, and girders, and whose floor and roof support consists of materials other than wood.

Concrete — Buildings whose structural framing consists of reinforced concrete poured in place, and whose floor or roof support consists of materials other than wood.

Masonry — Buildings whose exterior walls consist of concrete block, brick, precast concrete, and masonry other than poured-in-place reinforced concrete, and whose floor or roof support construction consists of materials other than wood.

Unclassified — Buildings for which it was impossible to determine materials used in structural members from construction reports.

TABLES

Table 1.–Construction characteristics of apartment building projects, by structural class–Pennsylvania, 1965

Structural class	Construction cost	Floor area	Housing units	Construction cost per square foot of floor area	Construction cost per housing unit	Floor area per housing unit	Average number of stories per building	Average number of housing units per building
	Thousand dollars	*Thousand sq. ft.*	*Number*	*Dollars*	*Dollars*	*Square feet*	*Number*	*Number*
Wood	69,944.4	8,024.8	7,824	8.72	8,940	1,026	2.5	60
Steel.	10,217.2	801.0	850	12.75	12,020	942	7.2	85
Concrete	32,713.7	2,431.2	2,157	13.46	15,166	1,127	12.7	216
Masonry.	27,943.2	3,375.9	3,179	8.28	8,790	1,062	3.0	67
Unclassified . .	14,265.0	2,225.2	2,131	6.41	6,694	1,044	3.1	73
All classes. . . .	155,083.5	16,858.1	16,141	9.20	9,608	1,044	4.3	72

Table 2.–Lumber and plywood used in apartment building construction, by structural class–Pennsylvania, 1965

Structural class	Lumber				Plywood (3/8-inch basis)			
	Total used	Use per square foot of floor area	Use per housing unit	Use per $1,000 of construction cost	Total used	Use per square foot of floor area	Use per housing unit	Use per $1,000 of construction cost
	Thousand board feet	*Board feet*	*Board feet*	*Board feet*	*Thousand board feet*	*Square feet*	*Square feet*	*Square feet*
Wood	35,494.3	4.42	4,537	507.5	10,623.4	1.33	1,358	151.9
Steel.	824.4	1.30	970	80.7	530.1	.66	624	51.9
Concrete	3,366.9	1.38	1,560	102.9	2,975.2	1.22	1,379	91.0
Masonry	7,383.5	2.19	2,323	264.2	2,339.6	.69	736	83.7
Unclassified . .	6,745.6	3.03	3,165	472.9	3,073.6	1.38	1,442	215.5
All classes . . .	53,814.7	3.19	3,334	347.0	19,541.9	1.16	1,211	126.0

Table 3.–Hardboard, particleboard, and insulation board used in apartment building construction, by structural class–Pennsylvania, 1965

Structural class	Hardboard (1/8-inch basis)				Particleboard (3/4-inch basis)				Insulation board (1/2-inch basis)			
	Total used	Use per square foot of floor area	Use per housing unit	Use per $1,000 of construction cost	Total used	Use per square foot of floor area	Use per housing unit	Use per $1,000 of construction cost	Total used	Use per square foot of floor area	Use per housing unit	Use per $1,000 of construction cost
	Thousand sq. ft.	*Square feet*	*Square feet*	*Square feet*	*Thousand sq. ft.*	*Square feet*	*Square feet*	*Square feet*	*Thousand sq. ft.*	*Square feet*	*Square feet*	*Square feet*
Wood	1,652.7	0.206	211	23.6	820.5	0.102	105	11.7	695.6	0.087	89	9.9
Steel	47.2	.059	56	4.6	38.2	.048	45	3.7	–	–	–	–
Concrete . . .	407.9	.168	189	12.5	156.3	.064	72	4.8	–	–	–	–
Masonry . . .	204.0	.060	64	7.3	371.7	.110	117	13.3	3.6	.001	1	.1
Unclassified .	200.5	.090	94	14.1	182.3	.082	86	12.8	0	–	–	–
All classes. . .	2,512.3	.149	156	16.2	1,569.0	.093	97	10.1	699.2	.041	43	4.5

Table 4.–Lumber consumption in apartments, by structural class, building component, and construction item – Pennsylvania, 1965

Building component and construction item	Structural class											
	Wood		Steel		Concrete		Masonry		Unclassified		All classes	
	Thousand bd. ft.	*Percent*	*Thousand bd. ft.*	*Percent*	*Thousand bd. ft.*	*Percent*	*Thousand bd. ft.*	*Percent*	*Thousand bd. ft.*	*Percent*	*Thousand bd. ft.*	*Percent*
Roof:												
Trusses	2,200.6	6.2	--	--	--	--	288.0	3.9	512.7	7.6	3,001.3	5.6
Rafters	1,490.8	4.2	18.1	2.2	--	--	310.1	4.2	134.9	2.0	1,953.9	3.6
Joists	1,881.2	5.3	54.5	6.6	161.6	4.8	376.5	5.1	195.6	2.9	2,669.4	5.0
Decking	248.5	.7	--	--	--	--	--	--	188.9	2.8	437.4	.8
Blocking	461.4	1.3	7.4	.9	30.3	.9	147.7	2.0	67.5	1.0	714.3	1.3
Other	177.5	.5	.8	.1	57.3	1.7	81.2	1.1	47.2	.7	364.0	.7
All roof	6,460.0	18.2	80.8	9.8	249.2	7.4	1,203.5	16.3	1,146.8	17.0	9,140.3	17.0
Floor:												
Joists	7,666.8	21.6	93.2	11.3	212.1	6.3	1,380.7	18.7	1,733.6	25.7	11,086.4	20.6
Subfloor	1,597.2	4.2	33.0	4.0	--	--	354.4	4.8	60.7	.9	2,045.3	3.8
Flooring	4,010.9	11.3	61.8	7.5	252.5	7.5	1,321.6	17.9	701.5	10.4	6,348.3	11.8
Other	319.4	.9	.8	.1	50.4	1.5	59.1	.8	54.0	.8	483.8	.9
All floor	13,594.3	38.3	188.8	22.9	515.1	15.3	3,115.8	42.2	2,549.8	37.8	19,963.8	37.1
Exterior wall:												
Studs	1,632.7	4.6	--	--	--	--	22.2	.3	195.7	2.9	1,850.6	3.4
Furring	319.4	.9	37.0	4.5	87.5	2.6	132.8	1.8	80.9	1.2	657.6	1.2
Siding	106.5	.3	--	--	--	--	--	--	80.9	1.2	187.4	.4
Other	213.0	.6	5.8	.7	27.0	.8	22.2	.3	40.5	.6	308.5	.6
All exterior wall	2,271.6	6.4	42.8	5.2	114.5	3.4	177.2	2.4	398.0	5.9	3,004.1	5.6
Interior wall:												
Studs	8,838.1	24.9	304.2	36.9	743.0	21.8	1,794.2	24.3	1,645.9	24.4	13,316.4	24.7
Furring	461.4	1.3	7.4	.9	26.9	.8	169.8	2.3	87.7	1.3	753.2	1.4
Other	71.0	.2	33.0	4.0	10.1	.3	51.7	.7	13.5	.2	179.3	.3
All interior wall	9,370.5	26.4	344.6	41.8	771.0	22.9	2,015.7	27.3	1,747.1	25.9	14,248.9	26.4
Millwork:												
Exterior doors	142.0	.4	--	--	20.2	.6	22.2	.3	87.7	1.3	272.1	.5
Interior doors	1,135.8	3.2	43.0	5.2	269.4	8.0	332.3	4.5	357.5	5.3	2,138.0	4.0
Windows	248.5	.7	--	--	20.2	.6	103.4	1.4	121.4	1.8	493.5	.9
Molding and shelving	1,029.3	2.9	20.6	2.5	168.3	5.0	199.4	2.7	94.4	1.4	1,512.0	2.8
Base cabinets	284.0	.8	27.2	3.3	94.3	2.8	59.1	.8	74.3	1.1	538.9	1.0
Wall cabinets	425.9	1.2	34.6	4.2	117.8	3.5	81.1	1.1	94.4	1.4	753.8	1.4
Other	106.5	.3	1.6	--	--	--	29.5	.4	13.5	.2	151.1	.3
All millwork	3,372.0	9.5	127.0	15.4	690.2	20.5	827.0	11.2	843.2	12.5	5,859.4	10.9
Facilitating:												
Formwork and other	425.9	1.2	40.4	4.9	1,026.9	30.5	44.3	.6	60.7	.9	1,598.2	3.0
Total	35,494.3	100.0	824.4	100.0	3,366.9	100.0	7,383.5	100.0	6,745.6	100.0	53,814.7	100.0

Table 5.–Plywood consumption in apartments, by structural class, building component, and construction item – Pennsylvania, 1965

Building component and construction item	Structural class											
	Wood		Steel		Concrete		Masonry		Unclassified		All classes	
	Thousand sq. ft.	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*
Roof:												
Decking	3,893.8	36.7	28.6	5.4	65.5	2.2	914.8	39.1	706.9	23.0	5,614.6	28.7
Soffit and other	170.0	1.6	--	--	59.5	2.0	63.2	2.7	30.7	1.0	323.4	1.7
All roof	4,068.8	38.3	28.6	5.4	125.0	4.2	978.0	41.8	737.6	24.0	5,938.0	30.4
Floor:												
Subfloor	2,794.0	26.3	--	--	199.3	6.7	802.5	34.3	673.1	21.9	4,468.9	22.9
Underlayment	658.6	6.2	52.0	9.8	6.0	.2	16.4	.7	547.1	17.8	1,280.1	6.5
Flooring	10.6	.1	154.8	29.2	199.3	6.7	--	--	501.0	16.3	865.7	4.4
All floor	3,463.2	32.6	206.8	39.0	404.6	13.6	818.9	35.0	1,721.2	56.0	6,614.7	33.8
Exterior wall:												
Siding	31.9	.3	--	--	--	--	37.4	1.6	9.2	.3	78.5	.4
Sheathing	998.6	9.4	--	--	--	--	--	--	147.6	4.8	1,146.2	5.9
All exterior wall	1,030.5	9.7	--	--	--	--	37.4	1.6	156.8	5.1	2,224.7	6.3
Interior wall:												
Paneling	21.2	.2	1.6	.3	3.0	.1	25.7	1.1	--	--	51.5	.3
Millwork:												
Exterior doors	53.1	.5	--	--	8.9	.3	9.3	.4	21.5	.7	92.8	.5
Interior doors	456.3	4.3	56.7	10.7	145.8	4.9	229.3	9.8	166.0	5.4	1,054.6	5.4
Shelving	318.7	3.0	39.2	7.4	122.0	4.1	74.9	3.2	55.3	1.8	610.1	3.1
Base cabinets	286.9	2.7	28.1	5.3	95.1	3.2	63.2	2.7	73.8	2.4	547.1	2.8
Wall cabinets	361.2	3.4	108.7	20.5	125.0	4.2	91.2	3.9	95.3	3.1	781.4	4.0
All millwork	1,476.7	13.9	232.7	43.9	496.8	16.7	467.9	20.0	411.9	13.4	3,086.0	15.8
Facilitating:												
Formwork	563.0	5.3	60.4	11.4	1,945.8	65.4	11.7	.5	46.1	1.5	2,627.0	13.4
Total	10,623.4	100.0	530.1	100.0	2,975.2	100.0	2,339.6	100.0	3,073.6	100.0	19,541.9	100.0

Table 6.–Hardboard, particleboard, and insulation board consumption in apartments, by structural class, building component, and construction item–Pennsylvania, 1965

HARDBOARD (1/8-inch basis)

Building component and construction item	Structural class											
	Wood		Steel		Concrete		Masonry		Unclassified		All classes	
	Thousand sq. ft.	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*	*Thousand sq. ft.*	*Percent*
Floor:												
Underlayment	807.7	48.9	25.4	53.7	–	–	–	–	91.4	45.6	924.5	36.8
Millwork:												
Interior doors	528.7	32.0	–	–	318.5	78.1	63.9	31.3	–	–	911.1	36.3
Base cabinets	257.5	15.6	20.1	42.6	79.1	19.4	108.3	53.1	89.2	44.5	544.2	22.0
Wall cabinets	58.8	3.5	1.7	3.7	10.3	2.5	31.8	15.6	19.9	9.9	122.5	4.9
All millwork	845.0	51.0	21.8	46.3	407.9	100.0	204.0	100.0	109.1	54.4	1,587.8	63.2
Total	1,652.7	100.0	47.2	100.0	407.9	100.0	204.0	100.0	200.5	100.0	2,512.3	100.0

PARTICLEBOARD (3/4-inch basis)

Floor:												
Underlayment	204.4	29.3	–	–	–	–	–	–	–	–	204.4	15.3
Millwork:												
Doors	30.8	3.7	–	–	–	–	–	–	–	–	30.8	2.0
Shelving	32.5	4.0	–	–	8.1	5.1	8.2	2.2	–	–	48.8	3.1
Base cabinets	401.0	48.9	31.4	82.1	123.6	79.1	234.3	63.0	139.1	76.3	929.4	59.2
Wall cabinets	115.8	14.1	6.8	17.9	24.6	15.8	129.2	34.8	43.2	23.7	319.6	20.4
All millwork	580.1	70.7	38.2	100.0	156.3	100.0	371.7	100.0	182.3	100.0	1,328.6	84.7
Total	820.5	100.0	38.2	100.0	156.3	100.0	371.7	100.0	182.3	100.0	1,569.0	100.0

INSULATION BOARD (1/2-inch basis)

Roof:												
Sheathing	11.2	1.6	–	–	–	–	–	–	–	–	11.2	1.6
Exterior wall:												
Sheathing	684.4	98.4	–	–	–	–	3.6	100.0	–	–	688.0	98.4
Total	695.6	100.0	–	–	–	–	3.6	100.0	–	–	699.2	100.0

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